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SOURCE Radio, No 1, 1950.A VOLTAGE REGULATOR

S. Livshits

A stable voltage supply is necessary for the proper operation of radio receivers, and in particular, of vacuum-tube measuring instruments. However, line voltage fluctuates greatly especially in rural districts. Thus, at peak load hours (winter evenings) the voltage is 15-20 percent lower than normal, while during light load periods it is 5-10 percent higher.

The means most frequently employed to keep the supply constant is an autotransformer with a variable ratio. Its principal drawback is the fact that if it is used to increase supply voltage when line voltage is low, the sudden increase in line voltage may damage the apparatus.

Ferroresonant regulators have a marked advantage over autotransformers, since they make it possible to maintain voltage with an accuracy of plus or minus 1 percent during fluctuations of line voltage up to plus or minus 20 percent. They are sufficiently simple in construction to require no attention while in operation. Iron from old transformers and paper condensers with large working voltages can be used to build this type regulator.

Operating Principle of the Regulator

The regulator is constructed like a transformer with a rectangular core, two of whose legs have different cross-sections. The primary winding is on the leg with the larger cross-section, the secondary on the leg with the smaller cross-section. When the line voltage is connected to the primary, the resulting current creates a magnetic flux sufficient to produce saturation conditions in the leg of small cross-section. Moreover, the circuit consisting of the secondary winding and the condenser across it is tuned to the line frequency. This increases the regulator's operating stability. Then, when the voltage in the primary winding varies, the magnitude of magnetic flux in the small leg changes only slightly; consequently, the variation in secondary voltage will be small.

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Even these small variations are smoothed by means of a compensation winding on the large leg which is connected in opposition to the secondary winding. Thus, even when line voltage fluctuations are large, the load voltage which is equal to the difference between the voltages on the secondary and compensation windings, will vary by only an insignificant amount.

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